BRIGHTON

AS A

HEALTH RESORT.

By ALFRED HAVILAND, M.R.C.S., F.R.M.C.S.

(Late Lecturer at St. Thomas's Hospital, London, on Medical Geography).

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Of whom may be obtained, price 2s. 6d.,

HAVILAND'S HEALTH-GUIDE MAP TO BRIGHTON,

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THE PUBLIC HEALTH.

The Registrar-General's weekly return shows that the annual rate of mortality last week in 28 of the largest English towns averaged 18·4 per 1,000 of their aggregate population, which is estimated at 8,469,571 persons in the middle of this year. The five healthiest places in the kingdom were Norwich, Derby, Bristol, Plymouth, and Brighton.—*Times*, July 14th, 1882.

The lowest rates last week ending the 15th inst. were 14·1 in NORWICH and BRIGHTON.—*Lancet*, July 22nd, 1882.

EXTRACT FROM REPORT OF SIR JOSEPH BAZALGETTE, C.B., C.E.,

JUNE 27TH, 1882.

"The branch sewers generally are too small to have enabled me to enter and inspect them, but having regard to their superior inclinations and the condition of the larger sewers which I examined, and which had not such rapid falls, and from the observations and inquiries I have made, extending over several days, I am of opinion that, with some minor exceptions, to which I have already referred, and for which I have suggested various remedies, the general condition of the sewers of Brighton is satisfactory, and there are no just grounds for assuming it to be an unhealthy place; on the contrary, I believe it still deserves the high reputation it has always maintained as a desirable place of resort for those who seek enjoyment of pure and invigorating air."

RESOLUTION OF BRIGHTON TOWN COUNCIL, JULY 5TH, 1882.

"The Surveyor is directed to forthwith carry out the suggestions of Sir Joseph Bazalgette to the fullest extent of the Council's jurisdiction."

LETTER FROM DR. RICHARDSON, M.D., F.R.S., TO THE MAYOR

(W. H. HALLETT, ESQ.).

Royal York Hotel, Brighton, July 13th, 1882.

DEAR MR. MAYOR,—My inquiries are yet far from being concluded, and the Report to be based on them is not yet commenced.

I may, however, convey to you that in the Schools and Educational Institutions of Brighton, to which, naturally, my attention has been first turned, I have found up to this time a freedom from contagious, and, indeed, from all disease, which is quite exceptional in my experience. The attention paid to sanitary details and supervision by the heads of the scholastic establishments I have visited is admirable, and deserving of the warmest commendation.

Faithfully yours,

B. W. RICHARDSON, M.D., F.R.S.

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Introduction.

There is an injury to which all Health Resorts are more or less liable, which frequently proves a most serious one. Supposing it is decided that an invalid should try Brighton, he is, in almost all cases, simply advised "to go" there, without the slightest caution as to what part of this Resort he should select, so as to obtain the greatest advantage from the change. He is not told to avoid such and such a part because of the soil or aspect being unsuitable; he is not warned as to whether his disease can encounter the full force of the prevailing winds, or whether it requires to be protected from them, while seeking the enjoyment of the untainted purity of the air as it comes from the sea. He is not advised to avoid those parts of the Town where free air-flushing of the streets cannot take effect, or those heights where the winds are keen, and to many detrimental, when blowing from certain quarters.

The consequence of a want of advice on such essential points is that too often persons come to Brighton and select, in hap-hazard manner, lodgings or houses situated in localities which are unsuited to the diseases for the cure or alleviation of which they were sent from home. If they return home worse than they came, their disappointment makes them ascribe to the climate the aggravation of their symptoms, and Brighton gets unjustly blamed.

Much might be done to avoid such mistakes. Every medical man should be thoroughly acquainted with the Geographical Distribution of Disease, at least in his own country, and he should know the physical geography, geology, and climate of every place to which he recommends a patient. To help the medical man and the invalid, I have constructed a Health Guide Map for Brighton, which will show the Geology of this Watering Place,—the different aspects of the various sites, the aspects and the directions of the axes of the streets, and the prevailing winds during the seasons of the year.

The study of the Geography of Disease should not be confined to the Medical Profession, as it is one eminently calculated to interest every intelligent person who has either his own or the health of others to consider. It is not an abstruse science, so far as its practical teachings are concerned, for its principles are few and simple, and once mastered can never be forgotten, as each day's experience will engrave them deeper and deeper in one's memory.

The invalid is not the only person for whom a Health Resort is demanded. He uses such places *as curative remedies*; there are, however, a vast number of others for whom provision has to be made, who require all the aid that *preventive* treatment can afford. Among this large class are children who have to be educated, and whose constitutional tendencies to disease, whether hereditary or otherwise, have to be studied before sending them to school, where they will have to pass the most important years of the developmental period of their lives. Take two instances, cancer and consumption, which are acknowledged to be hereditary. It would be the height of folly, with the knowledge we now possess of the geography of these fatal diseases, to send a child so tainted to a school situated in a locality the character of which we know to be favorable for the development.

Climate.

It is difficult to pourtray the factors of climate upon a map, and we must be contented with giving in a tabular form the statistics of the temperature of the air, the daily range—maximum and minimum—the monthly mean, together with the degree of humidity, amount of cloud, sunshine, rainfall, number of rainy days, mean pressure, and prevailing winds. These will be found at the foot of the map. The wind charts indicate the prevalence of the winds for each quarter of the year, and show at a glance how the winds change as the year rolls round. These charts, when studied together with the several aspects of the sites and the axes of the streets, will materially assist in the selection of a proper locality wherein to sojourn. Parallel lines drawn through the map, from the points of the compass in these charts, will show at once what is required with regard to aspect.

Physical Geography of Brighton.

The contour lines on the Health Guide Map indicate the levels at every 25 feet of altitude above the Town Datum, which is 4·46 feet below High Water Mark, ordinary Spring Tides. The letters on the 75 and 100 feet Contours refer to the points of the compass and give a clue to the different *Aspects* of the sites which rise above them. The ordinary eight points only are given, viz., N., N.E., E., S.E., S., S.W., W., and N.W, which agree with those of the Wind Statistics given under "Climate." The aspect of a site once ascertained, that of the streets or roads built upon it can easily be found, and the direction of their axes determined.

EXPLANATION OF THE CONTOUR LINES.

Before the hills and valleys of Brighton were built over, it would have been possible to walk for several miles on a contour line without going above or below the level which it indicates. The longest and most useful line of level is the 75 feet extending from the extreme western to the extreme eastern boundary, and by skirting the central valley to a considerable distance up the Preston and Lewes Roads, the level of 75 feet may be maintained throughout for a length altogether of about 8 miles.

The Contours indicate the slope of the ground and enable us to ascertain the several aspects. The letters N.E. on the side of a slope show that it has a North-Easterly aspect, and this continues till the highest point is reached.

THE VALLEY OF BRIGHTON

As it would appear to an observer at a height of 600 feet above the Beach at the Old Steine; he would not only see the Y shaped valley, but also the three spurs of the South Downs which immediately flank it. Looking towards the NN.E., the main portion of the valley lies straight in front, backed by the Ditchling Road ridge and flanked on the right (East) by the ridge which extends from the Race Course to Edward street and Kemp Town; whilst on the left (West) is the ridge which stretches from the junction of Upper North Street with the Dyke Road which continues to the Parliamentary Boundary. The North-Western or Preston valley corresponds with the course of the London Road and lies between the Dyke Road and the Ditchling Road heights; in a North-Easterly direction is the Lewes Road Valley, which lies between the Ditchling Road and the heights which culminate at the 425 feet contour line on Race Course.

The contours on the map will assist in apprehending the different aspects of the sides of these heights, over which sides the town is rapidly spreading. In former times, when the town was confined to the southern part of the valley, there was little variety as regards aspect.

It will be found that the boundaries of the valley comprised within the 75 and 100 feet contour lines, give a clue to the aspect of the land rising above them until the highest points of the ridges are attained, when of course there is a change. It is a singular fact that these two lines indicate the aspects of the whole of the inhabited portion of Brighton, Hove, and Preston, and although there is a multiplicity of aspects and climates, a study of these two lines in their meanderings will prove a ready mode of understanding the whole.

The parliamentary borough includes the three parishes of Brighton, Hove, and Preston, and the levels along its course give some idea of the protective influence, against certain prevailing winds, afforded by the three spurs of the South Downs that focus at Brighton.

(1) The western boundary has an entire length of $1\frac{2}{3}$ mile, and a mean altitude of 125 feet. It extends from the S.W. corner of Hove to the N.W. corner of Preston. The northern or Preston portion has a mean altitude of 158 feet, while that of the South or Hove portion is 53 feet.

(2) The northern boundary which has a length of about $1\frac{2}{3}$ mile and a mean altitude of 219 feet, extends from the N.W. corner of Preston to Roedean Corner on the Round Hill. The outlet of the Preston valley cuts this side within the 100 feet contour line.

(3) The North Eastern boundary is $1\frac{1}{2}$ mile in length and has a mean altitude of 228 feet, extending from Roedean Corner to the windmill on the Race hill. The Lewes Road Valley crosses this portion at the 100 feet contour line.

(4) The eastern boundary is $1\frac{1}{2}$ mile in length, and has a mean altitude of 210 feet. It extends from the windmill on the Race hill to the Rottingdean parish boundary, and to the seashore. The northern portion has a mean height of 300 feet, and the southern of 123 feet.

The protective influence of this semicircle of heights, in conjunction with another outer circle next described, is an important factor in the climate of Brighton and especially in relation to Lung disease.

THE OUTER PROTECTIVE SEMICIRCLE.

It consits of the following heights which surround the country between the South Downs and Brighton :—

Name of Height.	Height in feet.	Direction.	Distance from Junction Parade in Miles.
Southwick Hill	290	W.N.W.	5
Thnoderbarrow Hill	472	W.N.W.	6
Edburton (Camp)	600	N.W.	6½
Devil's Dyke (Camp)	697	N.W. by N.	5½
Woolstonbury (Camp)	600	N. by W.	6½
New Barn Hill	722	N.	5¾
Ditchling Beacon (Camp)	813	N. by E.	5¾
Plumpton Plain	713	N.N.E.	6¼
Mount Harry	639	N.E.	6½
Kingston Hill	586	E.N.E.	5
High Hill	412	E.	4
Looe's Barn Hill	300	E. by S.	4¼

Street Arrangements and Air-Flushing.

Between thirteen and fourteen years ago there occurred several sudden deaths from heart disease among those who travelled almost daily by rail between London and Brighton. For a time these cases arrested public attention, and caused comments to be made in the medical journals. It was generally believed that the excitement and hurry to which many were subject in going to and from home and office had much to do in the causing of these sudden deaths, and undoubtedly the history of several of them warranted the belief. At length (in 1868) a middle aged woman expired in one of the Underground Railway carriages, and at the inquest it was proved that she had hurried to catch the train immediately after a hearty meal. The medical evidence showed that this poor woman had a diseased heart, and a stomach filled with a meal just taken. Her full stomach oppressed her diseased heart and the excitement of her hurry strained it beyond its feeble powers. It collapsed beyond recovery, and death was the result. Soon after the occurrence of this typical case others followed, and the several inquests that were held upon them revealed histories similar in their main features. These cases made a deep impression on the public mind, and as a warning to railway passengers I wrote an article for one of the Medical Journals entitled "Hurried to Death." This article was reprinted and published in a separate form, soon after, by Mr. Renshaw and Mr. Mitchell. Whilst it was going through the press it occurred to me to enquire whether heart disease was more prevalent in some parts of England and Wales than in others. I consulted the Death Returns of the Registrar General and found that, during the ten years 1851-60, two hundred and thirty six thousand nine hundred and seventy three deaths were attributed to Heart Disease and Dropsy. These deaths I found most irregularly distributed throughout the Registrar's divisions, counties, and 625 districts. The average annual rate of mortality to every 1,000 persons living having been ascertained, I colored all the high mortality districts, or those above the average, *blue* in different shades, and all the low mortality districts, or those below the average, *red* in different shades. The highest mortality being represented by the deepest blue (the colour of venous blood) and the lowest mortality by the brightest red (the colour of arterial blood).

When my map was fully colored it presented the remarkable appearance which characterises those I have published in my work on "Geography of Heart Disease, Cancer, and Phthisis in England and Wales."

On carefully studying the several groups of high and low mortality in connection with the physical geography of our country I found that the lesson it taught was as remarkable as its appearance. It taught the grandest lesson of the effect of ventilation, and of the want of it, on the public health that it was possible to conceive.

All the blue (high mortality) districts were to be found in those parts of England and Wales that were most sheltered from the prevailing winds. (2) The degree of high mortality was influenced by the valley system, and in the direct ratio of a valley being shut out from the full advantage of being air-flushed by the winds so was the rate of mortality from heart disease. (3) Wherever the prevailing winds had free access, wherever the axes of the valleys and the rivers were in a line with those winds and the tidal wave, there was to be found the lowest mortality from this cause of death. (4) The degree of mortality was lowered in the direct ratio of the completeness of the air-flushing in these valleys.

I made a further investigation and found that in all the high mortality districts rheumatism prevailed, and that it was rare in those where there was the least heart disease. The connection between rheumatism and heart disease has long been well known to the medical profession, and it is well established that the heart disease which kills so many thousands annually has its origin in some one of the many forms of rheumatism.

The pent up valleys in some of the loveliest spots in England are never thoroughly flushed of their air sewage, in fact never thoroughly ventilated; the consequence being that they are often cold, damp, and filled with the air of vegetal decomposition, whilst the heights which wall them in are warm, dry, pure, bracing, and full of health. Frosts affect potatoes and fruit more frequently in the dewy calm air of a valley bottom than they do on the heights above, where the air is constantly changed. In such valleys man contracts rheumatism, the basis of the national heart

dise ase, and what is of equal importance to know is, that in such valleys all diseases of the zymotic class linger the longest and assume the most aggravated form. The rheumatic and fever miasms hang about the still air of the valleys, and as it were grow in strength with the accumulation of air sewage.

Free ventilation is the only preventive and cure, and the lesson taught us by the map of heart disease and rheumatism should be applied in building or reconstructing our towns and villages and especially our Health Resorts. A vicious plan of street arrangement has ever been and always will be a fertile source of injury to the Public Health, and particularly in a town like this, where, within a distance of 500 or 600 yards, the ground rises a couple of hundred feet. In some parts of it we see huddled within a comparatively small area streets, courts, and valleys whose names were especially associated with the Board of Health Report (1849) on the Sanitary condition of Brighton. Within the 200 feet contour there are streets like Dorset Street, Edward Street, Mighell Street, Carlton Hill, &c., shut out from the prevailing winds and affording every facility for the accumulation of air-sewage. Again, in the neighbourhood of Ditchling Rise there is a group of streets all built upon the same vicious system; and care must be taken by Hove that this system of mal-arrangement be not followed. Already is to be seen a sort of gridiron between Hove Drove and Goldstone Villas, which, when surrounded by other buildings will probably be a source of trouble as there is no provision for perfect air-flushing, all the streets being nearly at right angles to what the Wind Chart indicates as the prevailing winds at Brighton.

The main streets of Brighton afford protection both from the sun and wind, should either be too powerful for the invalid.

The 75 feet contour affords the clue to the direction of their axes, being E.S.E. on one side of the valley, and W.N.W. on the other side. The branch streets generally are at right angles to them, and hence will have a S.S.W. direction agreeing with the general aspect of the beach. These arrangements of streets, which arose from legal circumstances of tenure, actually secure full air-flushing from the prevailing southerly winds, and this is of great advantage in such a large town as Brighton, as the air gets changed whenever those winds blow.

The suction power of the wind blowing up the streets is, if the windows be open, exerted upon the air in the houses. This is preferable to the wind blowing straight into the windows, for frequently in that case they have to be shut, and the advantage of a change of air is lost. Wherever there are bow windows, the side sashes should be made to open, so as to secure the benefit of any wind that may blow.

I believe that if a weekly map record were kept of the localities in which diseases occurred, specially those of the zymotic class, the best of guides to the black spots in this or any other town would be provided. The geographising of disease would thus be carried to its fullest and most practical extent. The maps that I have published of London will serve as a record in the future of what was the distribution of disease before the opening up of wide thoroughfares through densely crowded localities. In laying out a new town it would be easy to prevent mischief by observing the rule that every street should be so built as to ensure a thorough air-flushing, but it is not easy to cure an evil state of things in an old town. There can be no doubt, however, as to the necessity of defining well where mischief lurks, and those in charge of the public health should then resolutely set to work to remedy the evil.

While streets require to be air-flushed and purged of their air-sewage, the sewers and tributary drains also require flushing with water. In this a mistake is often made. It is supposed that if the main drains be flushed as much is done as can be. Water is wasted in this way and the evil is not remedied, as not one of the tributary drains is cleansed. That can only be effected by the system I have advised to be adopted in some large towns, viz., *simultaneous flushing*. To carry this out a map of the drainage area should be divided into convenient districts, and certain days and hours appointed for each householder to turn the taps of his water service and let the water run for a given time —a quarter of an hour or half an hour—according to circumstances. Handbills should be circulated in the district to be flushed, giving the hour at which every householder in the district should begin his flushing. In times of epidemics, certain inodorous disinfectants, such as sulphate of iron in solution, may be poured down the drains. Disinfectants that have a strong scent should be avoided whenever possible.

One other suggestion I would make, that the water supply should be *constant* and not *intermittent*. I find that the Brighton authorities are fully alive to the necessity of this arrangement, and that rapid strides have been made in the conversion of the old intermittent system into a constant service. Since 1876 alterations to the number of 1,337 have been effected.

Geology.

RECENT.

1. SILT.—This is unrepresented by color, as it overlies the more important Coombe Rock (4). It consists of variously colored moulds, containing innumerable water-worn and subangular flints in the upper part of the **Y** shaped valley, and boulders of sandstone in the lower.

POSTPLIOCENE.

2. BRICK EARTH AND CLAY are found overlying the Coombe Rock at the western extremity of Brighton parish, and continue to the western boundary of Hove, when they overlie a bed of fine sand (3) and the Coombe with flint gravel deposit (5).

3. FINE SANDS.—These were found opposite Hove Drove, at the surface. At Cliftonville they were capped by the brick earth and clay (2), and opposite Brunswick Square were only reached at a depth of from 16 to 21 feet.

4. COOMBE ROCK OR THE ELEPHANT BED lies immediately on the chalk (10), and forms the base of the Y shaped valley. It consists of chalk rubble, flints rounded by water, and immense boulders of sandstone.

5. COOMBE AND FLINT GRAVEL.—In Hove parish a large area is covered by coombe, mixed with much flint gravel, and in some parts clay.

6. DRIFT CHALK.—A small patch of this is described as occurring to the south of the Western Road, and at the north of the streets between Preston Street and Montpellier Road.

7. OCHRACEOUS LOAM.—This deposit, in which are embedded large masses of conglomerate (puddingstone), is a highly ferruginous and fertile soil, and appears to be the result of the destruction of the lower beds of the plastic clay. It is of variable depth, fills up the pot holes in the chalk, and covers a wide area on the S.W. side of the West Hill, and extends across the N.E. side. It is a warm genial soil, and gives a healthful character to those parts where it is found.

TERTIARY.

8. TEMPLE FIELD DEPOSIT.—This is highly ferruginous, and is described by Howell as the wreck of the Eocene and chalk (more probably, however, of the chalk and the ferruginous greensand). It consists of beds of loam and splintered flints, reddish brown brick earth, bands of ironstone, ferruginous clay, with aluminite ironstone, breccia, &c., resting on chalk.

9. PLASTIC CLAY.—This lower Eocene or Tertiary deposit forms Furze Hill*, and consists of marine shell marl, reddish clay, succeeded by white clay, which becomes blue and then black, and rests on a bed of lignite, which is succeeded by dark clay. It resembles the plastic clay of Newhaven.

SECONDARY.

(10.) CHALK WITH FLINTS, OR THE UPPER CHALK.—This forms the base of the whole area. It is uncovered by drift along the precipitous sides of the Western Hill. When the contours take close together near the Preston Valley, the Round Hill, and the Race Hill, they are nearly free from drift, and the chalk lies close to the surface. The feet of all these three hills form the valley system, and there the chalk is covered with Coombe Rock (4) and its accompanying silt (1).

COOMBE ROCK (4).

Within the boundaries of the 75 contour in the Parish of Brighton (or Brighton proper) is contained this important geological formation on which a large portion of this watering place is built. It is indicated by a "fawn" tint on the map. It extends beyond the contour up the London Road and Lewes Road valleys. At the southern part of the main valley to the S.S.E., until in the Parish of Rottingdean, it forms the cliffs which skirt the sea. The rock has been well described by Mantell; it is composed principally of chalk rubble and comminuted flints. It is porous and, when first exposed to the air, soft. But after a time it hardens, as may be easily seen in the cliffs at Black Rock. Greenough, in his geological map, describes it as "detritus of chalk and clay, partly consolidated by stalactical matter." The hardening property does not depend on any clay it may contain, for, unlike clay, it will harden when exposed to rain, and hence it is used as a binding material for roads and pathways. It may be considered a dry subsoil when protected from the outbreak of springs, the neighbourhood of which should always be noted and attended to. In fact, the whole formation requires subsoil drainage.

The Coombe Rock is in the greater part of its area covered with drift mould of all descriptions, dark brown mould with flints, boulders, and every variety of wrecked ancient deposits once overlying the chalk before the upheaval of the Wealden formation and the destruction of the chalk and what overlaid it between the South and North Downs. This drift it often associated with ironstone. In the Coombe Rock the remains of the Mammoth have been found, and hence it has been called the "Elephant Bed." Subangular and rounded flints are met with in the mould and in the Coombe, and form an important element in the formation.

OTHER DRIFT ROCKS.

In the neighbourhood of Vernon Terrace, Clifton Hill, Clifton Road, and the Temple Field are found other postpliocene deposits which take the form of ochreous brown mould with ironstone. These lie on the chalk, and are coloured *yellow ochre* in the map. In the Temple Field there is a strange admixture of breccia, clay, clinkers, and ironstone; "Wrecks of the Eocene and Chalk Strata," according to the late James Howell, who has done more to elucidate the Geology of Brighton than any other person since Mantell. He says the Temple Field deposit in the Montpellier district slopes down the Western Hill towards the tertiary outlier at Furze Hill.

BRICK EARTH AND CLAY.

Very little of this formation, fortunately for Brighton proper, is to be found within the parish boundary; its limits are well defined by the reddish brown patch sloping upwards from the King' Road, near Russell Street, to the

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* Here the Chalybeate spring arises within the Wick Estate.

Western Road, West of Montpellier Road, whence it rises up to the 100 feet contour line passing through Temple Street, Borough Street, and Norfolk Road. Beyond the parish boundary, it is continuous with the same formation in Hove parish, extending in a diluted form as clay and flints, overlaid at the extreme S.W. corner by fine sand.

THE OCHREOUS EARTH OVERLYING THE CHALK.

Following the railway from the Montpellier district there is a broad belt of this deposit lying upon the chalk and filling up its potholes. It is everywhere interrupted (both N. and S.) by eccentric beds of clay which have been converted into brick fields. This formation is colored like that of the Montpellier district (but lighter), as there is every probability of their being identical.

COOMBE ROCK WITH FLINT GRAVEL.

In Hove parish this rock re-appears in the Fourth Avenue. In the Cemetery of St. Andrew's Church bodies are buried in tolerably typical Coombe Rock. But elsewhere, what is called Coombe is nothing more than flint gravel mixed with chalk rubble and sometimes clay in every variety. Opposite Goldstone Road is good clay, and in this locality generally the foundations of the houses are on clay. It is impossible to define the formations as they have been defined in Brighton proper, as no similar records have been kept like those supplied to me by Mr P.C. Lockwood, the Borough Surveyor.

Hove, geologically, differs widely from both Brighton and Preston, and a glance at the Health Guide Map is more convincing of this than anything that could be written. Both geologically and physically Preston is more closely allied to Brighton than Hove, which, although possessing generally a favorable aspect has many difficulties to overcome on account of the clayey soil which characterises the lower portion of its area, especially that towards the sea.

The Chalybeate Spring at Furze Hill, known as St. Ann's Well.

When the Wealden formation was upheaved and the overlying chalk wrecked, the sands and iron which formed its base were wrecked too, and the spoils of other formations were strewn everywhere within the supernatant waters. The fresh deposit took place at a time when the forms of life, which we now see around us, began as it were to dawn, hence the term Eocene is appropriately given, literally the " Dawn of the Recent."

Layers of ferruginous or iron-bearing sands may be traced all around the Weald and under the North Downs as far as Woburn, where they present all their typical characters, and hence, at one time, were designated the *Woburn Sands.*

The breaking-up of this vast area of iron-bearing strata resulted in the distribution of the iron ore plentifully throughout the different members of the Eocene or Tertiary period, where it is found with flints and other relics of formations with which it was once associated.

In the section of the Temple Field deposit, which I have taken from the late James Howell's MS. in the Brighton Free Library, we find Ochraceous Clay, Aluminate, Gypsum, and Hydrate of Alumina overlying the chalk. Also should be noted the large and extensive seam of Lignite underlying the blue, white, and reddish clays of Furze Hill. So far as sources of iron are concerned they are abundant in the neighbourhood. It must, however, be remembered that not every seam of iron ore (although supplied with springs) is capable of sending forth a Chalybeate water. For the earth to produce a Chalybeate a happy combination of circumstances is required, and especially to produce a *Carbonated Chalybeate*, of which kind is the water of St. Ann's Well.

Carbonic acid is a feeble acid in chemical combinations, and, in order to dissolve, and, at the same, to hold in solution, either iron or lime, it requires to be in excess in the waters which traverse these minerals. It is so feeble that exposure to the air or a raising of temperature of the fluid holding these bodies in solution is sufficient to relax its hold.

In the *Carbonated Chalybeates*, iron is contained in the form of a carbonate of its protoxide, that is, united with the smallest quantity of oxygen. This salt, by exposure to the air or by boiling, loses its carbonic acid, which escapes into the air, and in its place an additional atom of oxygen is attracted from the atmosphere, and sesqui-oxide is formed, which has an ochreous colour and is known as red-oxide of iron. It is this colour which characterises the ochraceous clays and loams in this district. In a true Carbonated Chalybeate the whole of the iron can be deposited, and this distinguishes it from a Sulphated Chalybeate, which does not part with its sulphuric acid in combination, either by exposure to the air or by boiling. The tenacity of sulphuric acid for iron, even in the presence of acids, renders a sulphated water less easy to assimilate with the human system and less suitable for delicate and irritable stomachs than the benign Carbonated Chalybeate, which is the most desirable form in which iron can be administered,

To the list of Carbonated Chalybeates belong the St. Ann's Well, the Islington Spa, Tunbridge Wells, and Oddy's Saline Carbonated Waters, at Harrogate. When the carbonic acid is in excess, and causes sparkling, as in the Pyrmont Water, the term acidulo-chalybeate is applied. The word chalybeate is derived from a people of ancient Pontus (the Chalybes), who were great workers in iron and steel.

It appears from the work of Dr. Relhan, that the celebrated Dr Russell (whom he succeeded) drew attention to this water of St. Ann's Well in a work entitled " A Short History of Brighthelmstone, with remarks on its air and an analysis of its waters, particularly of an uncommon mineral one long discovered, though not lately used." He says, " this spring issues from the declining part of a little hill covered with furze; the soil is loamy, with various shades of bole ochre and umbre." Until the summer of 1760, the spring was little used, but subsequently it became the resort of the fashionable visitors to Brighton, especially after notice was taken of it by Royalty. It then became for a time a rival to the Tunbridge Wells waters, until the caprice of fashion left it again to neglect.

The water has been submitted to several analyses, Pelham, and Marcet (1805), Henderson, Daniell, Graham, Wanklyn, and others, and all agree that it is a chalybeate that may be favourably compared with the most celebrated mineral waters, both at home and abroad. The most notable analysis was that made by the late Professor Graham, F.R.S., lecturer on chemistry at University College, London, and Master of the Mint. This accurate and painstaking chemist described the water of this spring in 1850 as the Brighton (Wick) *Natural Chalybeate Spa*, and said that it belongs to the class of *saline chalybeates*, and that the solid extracts of one imperial gallon of 70,000 grains were found to be as follows:—

Carbonate of Iron	3·325
Sulphate of Magnesia	7·525
Sulphate of Soda	14·000
Chloride of Sodium, &c.	12·250
Sulphate of Lime	14·175
Chloride of Calcium	11·550
	62·825 grains.

A later analysis by Professor Wanklyn, taken October, 1881, shows the following result:—

Silica	2·5
Protoxide of Iron	6·0
Sulphate of Lime	29·9
Sulphate of Magnesia	6·4
Chloride of Sodium	16·0
	60·8 grains.

This chemist further adds that the iron exists as a ferrous salt, a fact which is of considerable importance. He considers that the ferrous salt may be fairly given as a Carbonate, as Graham stated, and that the Silica exists in a soluble free state. The water is a very strong chalybeate, and there can be no doubt in the mind of any medical man acquainted with mineral waters that this "Natural Chalybeate Spa" is of extreme value to such a Health Resort as Brighton, and well adapted for all those cases requiring the judicious administration of iron, and especially those cases where difficulty is found in digesting some of the *medicinal* preparations.

I hope it may prove a true fountain of health to all who resort to it, and that it may attract to Brighton and Hove many who too frequently seek abroad that which Nature has provided for them at home. The present proprietor has done much to improve the natural beauties of this favoured spot, and has carefully provided for the comfort and recreation of invalids and others frequenting St. Ann's Well and Wild Garden.

Vital Statistics.

The population in 1881 of the Parliamentary Borough amounted to 128,382. Deducting for Hove 20,789, and West Preston 90, the Municipal Borough comprised Brighton 99,049 and East Preston 8,454, making together 107,503. The houses in the Parliamentary Borough were 22,201, having increased since 1871 by 4,824, a rapid growth which has to be provided for.

Every Health Resort may be regarded as a Hospital on a large scale, for it is visited and dwelt in by many strangers for the sake of being cured or relieved of their various ailments. We must, therefore, expect that the vital statistics of such places would differ somewhat from those of the districts in which they are situated.

Strangers are attracted to certain Health Resorts by a variety of circumstances; some because they are easily accessible from their homes; others on account of certain diseases to which they are prone being rare among the indigenous populations; others because relief and cure, in cases similar to their own, have followed residence in particular localities having certain peculiarities of site, soil, and climate. Some are attracted by the medical men with a reputation for success in the treatment of certain diseases; not a few are sent by their medical advisers at the end of the London season to seek at these places the relief which their prescriptions have failed to give.

From whatever cause these Health Resorts are frequented, certain it is that many persons go there to die, whilst others who go there to prolong life too frequently shorten it, through the want of knowledge of their advisers in sending them.

Some large Health Resorts have their vital statistics vitiated by the deaths which take place in their Hospitals, and all of them are subject to having their death-rate augmented by the reckless importation of infectious diseases in convalescent stages. These find their way to laundries and are thence rapidly spread among the poorer classes living in the comparatively unventilated parts of the town. These are some of the causes why the mortuary returns of Health Resorts cannot always be taken as tests of their natural healthiness as sites.

It may be safely inferred in their favour that if certain typical causes of death are below the general average of the country, notwithstanding all these disturbing influences, the Resort, if not favorable to the cure of such diseases, is not obnoxious to those suffering from them.

It is then always desirable to study the prevalent diseases of the neighbouring districts, for the geography of diseases tells us that diseases have natural groupings, which in many cases will teach us what would obtain in given towns but for the special social causes which influence the death returns.

Taken as a whole, Brighton may be safely said to possess naturally two of the most essential requisites for a healthy site that any town can enjoy—a prevailing *sea-wind*, as shown by the wind-chart, and a *well-drained* subsoil, as illustrated by Mr Edward Easton, C.E., in his interesting paper read before the Brighton Health Congress last December.* Speaking of the natural drainage of the chalk, he remarked—"The geological formation is that of chalk with flints. The whole of the rainfall, except that absorbed by the vegetation, or given off by evaporation, percolates at once into the chalk, and has its chief outlet in the sea. Its *chief* outlet, because all round the base of the great escarpment, at the northern boundary of the Chalk Downs, there flow out springs, more or less copious, which are formed by the overflow of the great chalk reservoir when saturation has taken place."

Nature has provided Brighton with the two principal factors of a healthy climate, but we must remember what the poet has said—"God made the *country*, but man the *town* did make." And Brighton being essentially a large town, we must not expect to find in it an exceptionally low death rate, either from all causes generally or from the majority of particular causes. Still, in the sequel, it will be seen that this watering place holds a high place amongst its peers, and that its natural advantages have striven (on the whole) successfully, for many years during its rapid growth, with the faulty arrangement of some of its streets, alleys, and cul-de-sacs with which it is handicapped.

By taking an average for ten or twenty years, full justice can generally be done as to the death-rates from different causes, and an estimate may be approximately formed of the healthiness, or otherwise, of any town. In rural districts, we can thus generally ascertain what diseases prevail, and what do not thrive in them. No reliance can be placed upon the statistics of a single year or season, and it were most unjust to condemn a watering place because it may be suffering from an imported epidemic.

From the zymotic class of diseases, Brighton for the ten years 1861-70 had a mean annual death rate below the general average of the country, viz., 46·6—that of England and Wales being 47·6 to every 10,000 persons living. These figures show too narrow a margin to say that these diseases do not thrive there when once introduced. If a map of the registration district of Brighton is colored in the sub-districts of Kemp Town, The Palace, and St. Peter's, in accordance with the respective rates of mortality, it will be seen where the diseases principally thrive. The estimated populations in the middle of the year 1881 were:—

Kemp Town	15,534
The Palace	21,210
St. Peter's	62,988
Giving a total for the whole of	99,732

During the year 1881, there were 13 deaths from zymotic diseases in *Kemp Town*, or 0·83 deaths to every 1,000 persons living, and 229 deaths from all causes, which gave a death-rate of 14·09 to every 1,000.

In the Palace sub-district there were 18 deaths from zymotic diseases, or 0·84 per 1,000, and from all causes 277 deaths, equal to an annual death-rate of 13·01 per 1,000.

In St. Peter's there were 178 deaths from zymotic diseases, or 2·66 per 1,000 living, and from all causes 1,394 deaths, equal to an annual death-rate of 22·13 per 1,000.

The mean of these death-rates for the whole district would be for the zymotic diseases 1·66, and from all causes 16·41, which figures will compare favourably with those from many other watering places. Undoubtedly, during the last quarter of the year, scarlet fever, measles, and whooping cough have contributed largely to swell the death returns. It must be remembered that in St. Peter's sub-district are to be found those labarynthine groups of streets to which I have drawn attention.

I have shown elsewhere that such a soil and such a site as Brighton happily enjoys are not conducive to the development of the terrible disease "cancer," yet there is a high death-rate recorded of it in this Health Resort. This is easily accounted for. Brighton lies between two districts, Steyning and Lewes, where climatic and physical conditions obtain which have been found to be coincident with a high mortality from cancer. They are riparial districts traversed by the rivers Adur and Ouse, which seasonally flood their adjacent alluvial plains. Brighton has hospitals and skilful surgeons, and these attract from without those suffering from this malady. Some return to their native homes, but more remain to die and swell the rate of mortality from this cause. I consider Brighton to be eminently calculated to prevent the development of cancer, and would recommend it in all cases where hereditary taint necessitates living in a locality that will prevent rather than promote its development.

Brighton has been favorably known for many years for the happy effect of the climate on *scrofulous* cases, and although many are sent there too late and die there, still the death-rate from scrofula was below the general average, 42 to every 1,000, while that of England and Wales was 43. I now come to a most important disease—consumption—or as it is entered in the Registrar-General's Returns—phthisis. During the ten years 1851-60, the death rates from this cause amongst females was just below the average for all England; whilst among males it was above the average. During the ten years, 1861-70, it had decreased among females and was slightly increased amongst males.

	MALES.		FEMALES.	
	England.	Brighton.	England.	Brighton.
1851-60	25·8	32·8	27·7	27·5
1861-70	24·6	34·7	24·8	25·4

To every 10,000 living.

* Transactions of the Brighton Health Congress, post free, 5s. John Beal and Co., Brighton.

During the latter decade, the death-rate among females decreased both throughout the country and in Brighton, but the decrease was not quite in proportion, and amongst males the rate actually increased.

Yet with all the influx of visitors, many of whom are known to have resorted to Brighton for this very disease, and must have died there, the death-rate shows that this Health Resort is, as a rule, favourable to the consumptive, and might be rendered still more so if those who visit it were to take care to select proper sites for their abodes whilst here. With this object I offer a few plain rules:—

1st, *As Regards Soil.*—Dense, undrained clays, whether they be brick-earth or plaster clay, should be avoided, and even gravel lying upon clay, if the former be not drained; for high well-drained clay is preferable to low undrained gravel. 2nd, *As to Aspect.*—The north-easterly and easterly aspects are the most obnoxious to the consumptive, and houses having either of these should not be selected. It is a great point for invalids with lung trouble to be out in the open air as much as possible taking gentle exercise. The map should be consulted and a locality chosen where the aspect ranges from S.S.W. to W., for these winds are the true *sea* winds, and although not so invigorating as those which blow over the North Sea uninterruptedly without passing over land for many hundred miles, they are the winds which are the most favourable to consumptives on the South Coast. But even these should be avoided in their full force, as the consumptive cannot stand a full force of wind from any quarter. A wide area at the S.W. of the Dyke Road, intersected by the Old Shoreham Road, has a most delightful climate. The soil is well-drained, rich, friable, and warm, and sloping gently towards the S.W. Here, when the easterly winds blow, is a delightful walk for the weak lunged, and a park should be so formed that invalids may be protected from weather all the year round, from the sun, the rain, and the too great force of the winds. Should this area be selected for building, it is to be hoped that the street arrangements will be planned so as to enable the residents to enjoy the full advantage of this favoured spot.

3rd, *With regard to Altitude.*—It is well in cases of consumption to avoid too high a level, for it must be remembered that whilst the inner protective circle shields the town from the obnoxious winds it prevents the escape of smoke from the valley, when the winds are gentle from the sea. The smoke then accumulates about the heights. Another point to study is to select bedrooms and sitting rooms in such a position as to ensure the sunshine having access to them during some part of the day. In the winter it is advisable to have both the rooms with the same aspect. In the summer the bedroom might have a westerly aspect. What is applicable to consumptives is equally so to many other diseases of the lungs, which taken as a whole are less fatal in Brighton than in very many other places throughout England and Wales; the general annual death-rate from these causes being 33·6 whilst that at Brighton is only 29·6 to every 10,000 persons living, thus corroborating what has been said of Phthisis, that Brighton has a climate favorable to the amelioration and cure of those who suffer from lung trouble.

It has been shown that heart disease and its too frequent sequel, dropsy, are intimately associated with rheumatism in its protean forms, and that valleys and groups of streets should be avoided where free ventilation by the sea winds cannot be obtained. The Health Guide Map will indicate such places. Not the rich only seek Brighton for its health restoring properties, and a large class of visitors must take up their abodes in the smaller and more crowded streets; it is to be hoped that the intelligent artizan will be enabled, by the map, to exercise his common sense, and select the least obnoxious sites for his residence, otherwise he had better stay away.

From the idea that a change from the inland to the seaside is curative, watering-places are peculiarly liable to the importation of whooping cough, which is classed among zymotic diseases. Brighton suffers in this respect like some other large Health Resorts. In a paper I read in 1875 before the Social Science Congress, which was held at Brighton, I showed that whilst the large Health Resorts had a high death-rate from this cause, their respective coastal districts were, as a rule, characterised by a low mortality. When once whooping cough is imported, it is difficult to keep it from spreading, and until this disease is better understood, we shall still be burthened with fresh theories and fresh nostrums for it. The annual average mortality in Brighton during 1861-70 was at the rate of 60 to every 10,000 living, that for England and Wales being 53.

I have yet to make a few remarks on diseases of the liver and stomach and kidneys. Considering the number of persons visiting Brighton with these organs more or less affected, it speaks well for the climate that the death-rate for liver complaints is so little above the average, viz., 100 to every 10,000, or only 3 above that for England generally (98). All persons ought to be careful that the skin, with its 28 miles length of perspiratory tubing, is well protected from chill. In the cases of invalids with weak internal organs this carefulness is of vital importance. The effect of a chill of the surface is at once to throw the blood inwardly and cause congestion of the *weakest* organ, whether it be liver, kidneys, lungs, or any other organs. Many people pass the winter without risk, but the sunny days of early spring and summer lead them into the temptation of prematurely throwing off garments which they had better keep on, and substituting cooler for warmer clothes before the sun is high enough to establish the fixed mean temperature of summer. The death-rate for affections of the kidneys is high, being 11 above that of England and Wales in 1861-70, which was 29 in every 10,000 living. The wind charts show the seasonal prevalence of the winds, and it would be well for those who are liable to congested or other affections of the great organs of the body to avoid Brighton during those months when chilling winds prevail.

In fine, Brighton as the largest seaside Health Resort in England, should be carefully studied by all those who visit it for health sake, possessing, as it does, such a variety of soils, such a variety of aspects, and such a variety of levels. It would be unwise in the extreme to lead anyone to believe that simply by going to Brighton he will find relief from his ailments, and such haphazard advice will, in many cases, cause disappointment. As a step towards a knowledge of this far-famed Health Resort, I have constructed the Health Guide Map, in the hope that it will help medical men, and the public generally, to use the natural advantages of this great seaside town, so as to cull the greatest benefit from them, and thus increase the reputation and usefulness of Brighton.